NASA SBIR/STTR Technologies

H14.01-8449 - Orbital Fiber Optic Production Module

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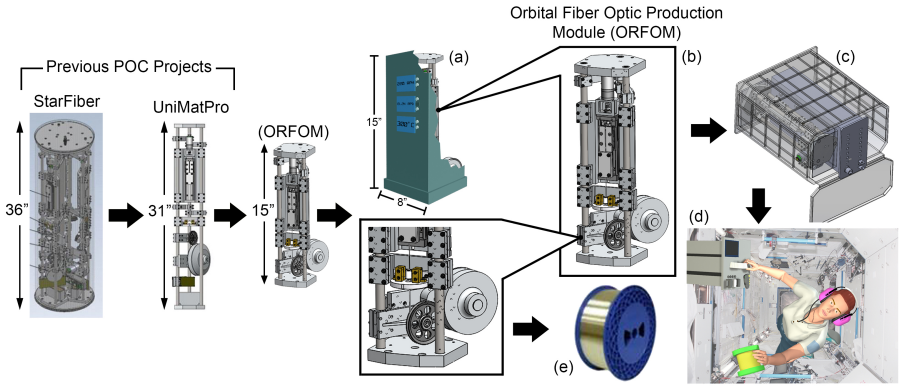
Identification and Significance of Innovation

To meet NASA's needs for sustainable space operations and full utilization of the International Space Station (ISS), Physical Optics Corporation will develop a novel Orbital Fiber Optic Production Module (ORFOM). ORFOM is a ruggedized and compact fiber draw system that enables production of high-quality, low-loss (losses reduced by >10x) optical fibers in zero gravity. Phase I development will enable a prototype to be integrated into the form factor of a NanoRacks ISS module. Preliminary effort will focus on ZBLAN optical fiber, which has applications in lasers and optical transmission of wavelengths ranging from ultraviolet (UV) through mid-wave infrared (MWIR); this showcases the utilization of the ISS in high-value manufacturing.



Estimated TRL at beginning and end of contract: (Begin: 2 End: 4)

Technical Objectives and Work Plan

Phase I Technical Objectives

Objective 1. Preliminary requirements and specifications for ORFOM module.
Objective 2. Design a system to fit in NanoLabs module.
Objective 3. Demonstrate a prototype and fiber drawing.
Objective 4. Preliminary establishment of the commercial potential.

Phase I Work Plan

Task 1. Define Requirements and Specifications
Task 2. Finalize System Architecture and Overall Design
Task 3. Design Mechanical, Electronic, and Thermal Components
Task 4. Assemble and Test the Prototype
Task 5. Plan Path Forward for Orbital Mission
Task 6. Explore the Commercial Potential and Product Viability
Task 7. Prepare and Submit Reports

NASA Applications

Production of low transmission loss ZBLAN optical fibers in zero gravity for applications in:

- Optical transmission from UV through MWIR for hyperspectral orbital imaging systems
- Eye-safe and mid-IR fiber lasers for remote sensing and LIDAR
- IR fiber bundles for remote thermal imaging

Non-NASA Applications

- Production of other fluoride, oxide, and chalcogenide optical fibers for material processing, medical, and military applications
- Eyesafe, blue, and MWIR fiber lasers based on rare-earth doped ZBLAN fibers for industrial, medical, and military customers
- Fiber bundles for remote thermal imaging for medical and industrial sensing

Firm Contacts

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